

AMENDMENTS TO THE CLAIMS

1. (Cancelled)

2. (Currently Amended) A system comprising:

a network;

a first computer coupled to said network, said first computer comprising a first visual display and a first interface device capable of providing a first computer input, said first interface device comprising an actuator capable of providing tactile sensations in response to a haptic feedback signal provided by said first computer, said first computer developing a first image in a first gaming environment on said visual display that is associated with first stored tactile sensation information, wherein said first computer produces said first image and said haptic feedback signal based at least in part on information received from a second computer and based at least in part on said first computer input[[],]; and

said second computer coupled to said network and comprising a second visual display and a second interface device capable of providing a second computer input, said second interface device comprising an actuator capable of providing haptic feedback in response to a haptic feedback signal provided by said second computer, said second computer developing a second image in a second gaming environment on said second visual display substantially simultaneously with said development of said first image in said first gaming environment, said second image associated with second stored tactile sensation information, wherein said second computer produces said second image and said haptic feedback signal based, at least in part, on information received from said first computer and based, at least in part, on said second computer input.

Claims 3-4. (Cancelled)

5. (Currently Amended) A system as recited in claim 2 wherein said first interface device includes a user manipulatable object for receiving input from a ~~said~~ user, said user manipulatable object being movable in two degrees of freedom.

6. (Previously Presented) A system as recited in claim 5 wherein said first interface device includes a local controller that communicates with said first computer, a plurality of actuators for providing said tactile sensations, and at least one sensor for sensing positions of said user manipulatable object.

7. (Previously Presented) A system as recited in claim 5 wherein said user manipulatable object is receptive to a finger of said user for manipulating said user manipulatable object in said two degrees of freedom.

8. (Previously Presented) A system as recited in claim 6 wherein said haptic feedback signal includes a haptic feedback command that can be parsed by said local controller such that said controller can control said actuators in response to said haptic feedback command in a control loop with said sensors.

Claims 9—11. (Cancelled)

12. (Previously Presented) A system comprising:

a first computer means coupled to a network means; and

a second computer means coupled to said network means, said second computer means comprising a visual display means, said visual display means comprising means for displaying a graphical environment, wherein said graphical environment is based, at least in part, on information transferred from said first computer means to said second computer means, and human/computer interface means, wherein said human/computer interface means comprises an actuator means, said second computer means further comprising means for interpreting said information repeatedly received from said first computer means over said network means, updating said visual display means based, at least in part, on said information, and causing said actuator to generate a physical feel sensation at said human/computer interface means based, at least in part, on said information.

13. (Previously Presented) A system as recited in claim 12 wherein said second computer means input comprises at least one of a position input for said human/computer interface device, and a button click input.

14. (Previously Presented) A system as recited in claim 12 wherein said human/computer interface means coupled to said second computer means includes a local controller means that communicates with said second computer means, a plurality of said actuator means for providing said physical feel sensations.

15. (Previously Presented) A system as recited in claim 14 wherein said second computer means sends a force feedback command to said local controller means that can be parsed by said local controller means such that said controller means can control said actuator means in response to said force feedback command in a control loop with said sensor means.

Claim 16. (Cancelled)

17. (Currently Amended) A method for providing haptic feedback, comprising:

receiving first computer information from a first computer at a second computer over a network, wherein said first computer information comprises information representing a position of a user manipulatable object;[[.]]

generating an image to be displayed on a visual display of said second computer;

receiving input information at said second computer from a haptic feedback device; and

causing a tactile sensation signal to be provided to said haptic feedback device from said second computer, said tactile sensation signal being based, at least in part, on said first computer information and said input information, wherein said haptic feedback signal causes said haptic feedback device to output haptic feedback.

18. (Previously Presented) A method as recited in claim 17 wherein said first computer information includes haptic feedback information indicating a tactile sensation to be output by said second haptic feedback device.

19. (Previously Presented) A method as recited in claim 17 further comprising sending second computer information from said second computer to said first computer over said network.

20. (Previously Presented) A method as recited in claim 19 wherein said second computer information includes said input information from said second haptic feedback device and haptic feedback information indicating a tactile sensation to be output by said first haptic feedback device.

21. (Previously Presented) A method as recited in claim 17 wherein said image includes displaying a first graphical object controlled by a user of said first haptic feedback device, and displaying a second graphical object controlled by a user of said second haptic feedback device.

22. (Original) A method as recited in claim 21 wherein said first and second graphical objects are paddles.

23. (Original) A method as recited in claim 21 wherein said first and second graphical objects are displayed in a web page.

Claim 24. (Cancelled)

25. (Previously Presented) A method as recited in claim 17 wherein said second haptic feedback device includes a local controller that communicates with said second computer, wherein said local controller parses a haptic feedback command sent by said second computer such that said local haptic can control said actuator in response to said haptic feedback command in a control loop with at least one sensor of said second haptic feedback device.

Claim 26. (Cancelled)

27. (Currently Amended) A method for providing physical interaction over a computer network comprising:

enabling first information comprising an indication of movement of a first manipulandum coupled to a first computer and first feel sensation information indicating a type of force sensation to be output by said first computer over said computer network to a second manipulandum coupled to a second computer;

causing a first force to be applied to said second manipulandum based at least in part on said indication of movement of said first manipulandum and said first feel sensation information;

enabling second information comprising an indication of movement of said second manipulandum and second feel sensation information indicating a type of force sensation to be output by said second computer over said computer network to said first manipulandum; and

causing a second force to be applied to said first manipulandum based, at least in part, on said indication of movement of said second manipulandum.

28. (Original) A method as recited in claim 27 further comprising developing an image on a visual display of said first and second computers, said image portraying a graphical environment at least partially responsive to said movement of said first manipulandum or said second manipulandum.

29. (Original) A method as recited in claim 28 wherein said graphical environment includes a first graphical object controlled by said first manipulandum and a second graphical object controlled by said second manipulandum, and wherein when said first and second graphical objects interact in said graphical object, forces are applied to said first manipulandum and said second manipulandum.

Claims 30—32. (Cancelled)

33. (Previously Presented) A method as recited in claim 27 wherein said first manipulandum and said second manipulandum are each included in a haptic feedback device, said haptic feedback

device including a local controller parsing commands from one of said first and second computers.

34. (Previously Presented) A method as recited in claim 33 wherein said haptic feedback devices each include at least one sensor for determining a position of said manipulandum of said haptic feedback device, and at least one actuator for outputting a force in a degree of freedom of said manipulandum of said haptic feedback device.

Claim 35. (Cancelled)

36. (Currently Amended) A method as recited in claim 38 wherein said first computer receives input information from said first haptic feedback device in response to manipulation of said first haptic feedback device by a ~~said~~-first user, and wherein said second computer receives input information from said second haptic feedback device in response to manipulation of said second haptic feedback device by a ~~said~~-second user.

37. (Previously Presented) A method as recited in claim 36 wherein said haptic feedback signal from said first and second computers is based, at least in part, on said input information from said first and second haptic feedback devices, respectively.

38. (Previously Presented) A method for providing haptic feedback between a first computer and a second computer comprising:

sending first computer information to said second computer from said first computer over a network, wherein said first computer information comprises position information describing a position of a manipulandum of a first haptic feedback device;

causing a haptic feedback signal to be sent to a second haptic feedback device from said second computer, said haptic feedback signal being based, at least in part, on said first computer information, wherein said haptic feedback signal causes said second haptic feedback device to output a force;

sending second computer information to said first computer from said second computer over said network, wherein said second computer information comprises position information describing a position of a manipulandum of a second haptic feedback device; and

causing a haptic feedback signal to be sent to said a haptic feedback device from said first computer, said haptic feedback signal being based, at least in part, on said second computer information, wherein said haptic feedback signal causes said first haptic feedback device to output a force.

39. (Previously Presented) A method as recited in claim 38 wherein said first computer information includes haptic feedback information indicating a tactile sensation to be output by said second haptic feedback device, and wherein said second computer information includes haptic feedback information indicating a tactile sensation to be output by said second haptic feedback device.

40. (Currently Amended) A method as recited in claim 39 wherein said first and second computers each display a graphical environment having a first graphical object controlled by a ~~said~~ first user and a second graphical object controlled by a ~~said~~ second user.

41. (Cancelled)

42. (Previously Presented) A method as recited in claim 38 further comprising accessing a server computer with one of said first and second computers and downloading feel sensation information from said server computer, said feel sensation information to be included in said first computer information or said second computer information.

43. (Original) A method as recited in claim 42 wherein said server computer provides a web page downloaded to said computer accessing said server, said web page including embedded feel sensation information.

44. (Previously Presented) A system as recited in claim 2 wherein said first computer and said second computer communicate with at least one server over said network, wherein said information received from said first computer and said information received from said second computer are communicated via said server.

45. (Previously Presented) A system as recited in claim 2 wherein said image displayed in said second gaming environment includes a graphical object that can interact with a projectile.

46. (Previously Presented) A system as recited in claim 45 wherein said projectile includes a ball or puck.

47. (Previously Presented) A system as recited in claim 2 wherein said image displayed in said second gaming environment includes a graphical object having a location based, at least in part, on position information received from said second interface device, said graphical object able to collide with a different graphical object displayed in said second gaming environment, said different graphical object having a location based at least in part on said information received from said first computer.

48. (Previously Presented) A system as recited in claim 2 wherein said image displayed in said second gaming environment includes a graphical object having a location based, at least in part, on position information received from said second interface device, said graphical object able to collide with an obstruction displayed in said second gaming environment.

49. (Previously Presented) A system as recited in claim 12, wherein said second computer means receives position information from said first computer means over said network, said position information describing a position of a user manipulatable object of human/computer interface means included in said first computer means.

Claim 50. (Cancelled)

51. (Previously Presented) A method as recited in claim 17 wherein said first computer information includes information needed to update a simulated graphical object displayed by said second computer.

52. (Previously Presented) A method as recited in claim 19 wherein said second computer information includes information needed to update a simulated graphical object provided in an environment running on first computer.

53. (Previously Presented) A method as recited in claim 17 wherein said first computer provides said first computer information to a server computer in communication with said network, and wherein said server computer provides information based, at least in part, on said first computer information to said second computer.

54. (Previously Presented) A method as recited in claim 17 wherein said first computer provides said first computer information to a server computer in communication with said network, and wherein said server computer performs processing on said first computer information before sending said first computer information to said second computer.

55. (Previously Presented) A method as recited in claim 17 wherein said first computer and said second computer receive information from a server computer in communication with said network.

56. (Previously Presented) A method as recited in claim 55 wherein said information received from said server is feel information describing at least one tactile sensation able to be output on said first haptic feedback device and said second haptic feedback device.

Claim 57. (Cancelled)

58. (Previously Presented) A method for providing haptic feedback comprising:

receiving first computer information from a first computer at a server computer over a network;

providing said first computer information to a second computer, wherein said first computer information comprises information operable to update a simulated graphical object in a graphical environment output by said second computer, and wherein at least one of said second computer and said server computer uses said first computer information to update a game program running on at least one of said second computer and said server computer, and wherein said second computer provides a second haptic feedback signal based at least in part on said first computer information to a second haptic feedback device;

receiving second computer information from said second computer at said server computer over said computer network; and

providing said second computer information to said first computer, wherein said second computer information comprises information operable to update a simulated graphical object in a graphical environment output by said first computer, and wherein at least one of said first computer and said server computer uses said second computer information to update a game program running on at least one of said first computer and said server computer, and wherein said first computer provides a first haptic feedback signal based at least in part on said second computer information to a first haptic feedback device.

59. (Previously Presented) A method as recited in claim 58 wherein said first computer information includes force information describing a tactile sensation, wherein said tactile sensation is output by said second haptic feedback device.

60. (Previously Presented) A method as recited in claim 58 further comprising sending tactile sensation data stored on said server computer to said first computer.

61. (Previously Presented) A method as recited in claim 58 wherein said first computer information comprises position data allowing said second computer to display a graphical object in said graphical environment output by said second computer.

62. (Previously Presented) A method as recited in claim 58 wherein said server computer runs a web page.

63. (Previously Presented) A method as recited in claim 58 wherein updating said game program running on said first computer includes updating a location of a displayed player graphical object based at least in part on said second computer information.

64. (Previously Presented) A method as recited in claim 58 wherein said updating of said game program running on said first computer includes updating a location of a projectile.

65. (Previously Presented) A method as recited in claim 64 wherein said projectile is a ball or a puck.

66. (Previously Presented) A method as recited in claim 63 wherein said displayed player graphical object represents a sporting object.

67. (Previously Presented) A method as recited in claim 66 wherein said displayed player graphical object includes a weapon.

68. (Previously Presented) A method as recited in claim 63 wherein a collision between said player graphical object and a different graphical object is detected, and wherein said first haptic feedback signal is based at least in part on said detected collision.

69. (Previously Presented) A method as recited in claim 68 wherein said different graphical object is a projectile.

70. (Previously Presented) A method as recited in claim 68 wherein said different graphical object is an obstruction in said game environment.

Claim 71. (Cancelled)

72. (Previously Presented) A method as recited in claim 75 wherein said first computer is a client computer and said second computer is a server computer.

73. (Previously Presented) A method as recited in claim 75 wherein said first computer and said second computer are client computers.

74. (Previously Presented) A method as recited in claim 75 wherein said information received from said second computer includes web page information.

75. (Previously Presented) A method for providing haptic feedback over a computer network comprising:

receiving first information at a first computer from a second computer over a network, said information comprising haptic feedback information and position information for a graphical object displayed by said second computer;

using said first information to repeatedly update a visual display running on said first computer, and wherein said first computer repeatedly provides a haptic feedback signal based at least in part on said haptic feedback information to a haptic feedback device, wherein said haptic feedback device outputs a tactile sensation based, at least in part, on said haptic feedback signal and correlated with said updated visual display; and

sending second information from said first computer to said second computer over said computer network.

76. (Previously Presented) A method as recited in claim 73 wherein said haptic feedback device is a first haptic feedback device, and wherein said second computer includes a second haptic feedback device providing computer-controlled physical tactile sensations to a user of said second haptic feedback device.

Claim 77. (Cancelled)

78. (Previously Presented) A method as recited in claim 75 wherein said visual display is updated by moving a graphical object within a graphical game environment based, at least in part, on position data received from said haptic feedback device, where a collision between said graphical object and a different graphical object can be detected to cause said tactile sensation to be output.

79. (Previously Presented) A method as recited in claim 75 wherein said first computer receives an indication of a gaming event in said information, said first computer synchronizing said visual display associated with said gaming event with said tactile sensation that is associated with said gaming event.

80. (Previously Presented) A method as recited in claim 79 wherein said gaming event is a collision.

81. (Previously Presented) A method as recited in claim 79 wherein said gaming event is an explosion.

82. (Previously Presented) A method as recited in claim 79 wherein said visual display is updated at a rate substantially faster than said tactile sensation.

Claim 83. (Cancelled)

84. (Previously Presented) A device as recited in claim 89 wherein said information has been received by said host computer from a server machine connected to said network.

85. (Previously Presented) A device as recited in claim 89 wherein said information has been received by said host computer from a client machine.

86. (Previously Presented) A device as recited in claim 84 wherein said server machine and said host computer communicate over said network using TCP/IP protocols.

87. (Previously Presented) A device as recited in claim 89 wherein said haptic feedback data includes at least one command, and wherein said local controller parses said command to control said actuator.

88. (Currently Amended) A device as recited in claim 89 further comprising a button input device having a state responsive to manipulation by a ~~said~~-user, wherein said state of said button input device is provided to said local controller and from said local controller to said host computer.

89. (Currently Amended) A device comprising:

- a network;

- a first computer in communication with said network;

- a user manipulatable object moveable in at least one degree of freedom and operable to control a position of a first graphical object displayed by said first computer in a graphical environment;

- an actuator operative to output a tactile sensation;

- at least one sensor operative to detect a position of said user manipulatable object in at least one degree of freedom, wherein position data describing said detected position is provided to said first computer; and

- a local controller, separate from and communicating with said first computer, and coupled to said actuator and said sensor, said local controller receiving haptic feedback data from said first computer, said haptic feedback data coordinating a tactile sensation to be output by said actuator with interaction between said first graphical object and a second graphical object displayed in a graphical environment by said host computer, wherein said haptic feedback data and a state of said displayed second graphical object are derived using ~~said~~-information received by said first computer from a second computer in communication with said network and said position data.

90. (Previously Presented) A device as recited in claim 84 wherein said user manipulatable object is constrained to move in two planar degrees of freedom, wherein said actuator is a first voice coil actuator, and further comprising a second voice coil actuator, wherein said cursor is controlled by said user manipulatable object to select said displayed element on said web page.

Claim 91. (Cancelled)

92. (Currently Amended) A method as recited in claim 101 ~~97~~ wherein said local model of said particular client computer also receives button data from said associated haptic feedback device, said button data describing a state of at least one button on said associated haptic feedback device.

93. (Currently Amended) A method as recited in claim 101 ~~97~~ wherein said first graphical object is a representation of sporting equipment.

94. (Previously Presented) A method as recited in claim 93 wherein said second graphical object is a representation of a ball or puck.

95. (Currently Amended) A method as recited in claim 101 ~~97~~ wherein said first graphical object includes a representation of a weapon.

96. (Currently Amended) A method as recited in claim 101 ~~97~~ wherein each of said local models of said computer-gaming simulation of said multiple client computers displays a graphical object having a location influenced by position data received from an associated interface device in communication with each client computer.

97. (Cancelled)

98. (Currently Amended) A method as recited in claim 101 ~~97~~ wherein a sound is associated with an event occurring in said computer-gaming simulation, wherein said computer

synchronizes the output of said sound with said tactile sensation that is associated with said event.

99. (Previously Presented) A method as recited in claim 98 wherein said event is a collision in said computer-gaming simulation.

100. (Previously Presented) A method as recited in claim 98 wherein said event is an explosion in said computer-gaming simulation.

101. (New) A method comprising:

- executing a first local model of a computer-gaming simulation on a first computer;
- executing, substantially simultaneously with said first local model, a second local model of said computer-gaming simulation on a second computer in communication with said first computer over the Internet;

- updating a location of a first graphical object of said first local model based at least in part on position data output by a sensor in communication with a haptic input device in communication with said first computer, said haptic input device comprising an actuator configured to output haptic feedback to said haptic input device;

- updating a location of a second graphical object based at least in part on information received over said Internet from said second computer, said information comprising a gaming event; and

- determining, by said first computer, whether said first graphical object and said second graphical object interact, and, if so:

- determining a haptic effect to be output, and

- outputting said haptic effect to said haptic input device, said haptic effect configured to be substantially synchronized with said gaming event.